Draft of Plan of Operation

for

Drafting and Printing of

the Fourth Year's Work

and

Map Symbol's Specification

(December, 1994)

DRAFT OF PLAN OF OPERATIONS
FOR
DRAFTING AND PRINTING (FOURTH YEAR)

TOPOGRAPHIC MAPPING
OF
BOLIKHAMXAI PROVINCE
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

DECEMBER, 1994

JAPAN INTERNATIONAL COOPERATION AGENCY

T K.

1. Intrduction

As this is the last occasion for the JICA Study Team to meet and discuss the matters concerning the Study with NGD, herein is tentatively set up a Plan of Operations for the fourth year This draft is based on the mutual technical discussion to use the sample maps which were prepared by the Team as a first trial. It is, however, subject to modification according to the progress of the Study of the third year and/or other conditions which might affect the progress of the Study.

2. Drafting

Drafting is the process to prepare the drafted original to proceed to processes of making of printing plate for map publication based on the field completed and revised compilation manuscript and data sheets. It is called "the original manuscript of the map". For final drafting, "negative scribing method" is widely applied at present. For multi-color printing, different plates shall be prepared for respective color (Color separation scribing). This implies the preparation of a sheet corresponding to a negative film of photography by scribing a scribing basel. The image on this sheet is printed photo-lithographically onto a printing plate (negative plate making method).

For the Study, the map shall be printed in five colors. Consequently, the color separation shall be in five colors.

1) Map style

Map style and conventional signs shall be specified in the "Map symbols and their application rule for drafting" which was discussed and mutually agreed between the JICA Study Team and NGD.

2) Materials to be used

Following materials shall be used depending on the kind of products to be prepared:

The size is 620 mm X 620 mm for all sheets.

The paper quality shall be of 90 g/m^2.

Material	Quantity	Remark
Scribing sheet	112 sheets x 5	Scribed sheet (Red, Black, Blue, Brown, Green)
Polyester sheet	112 sheets x 4	Annotation sheet (Red, Black, Blue, Brown)
	112 sheets x 2	Symbol sheet (Black, by manual method)
	112 sheets x 4	Hold out mask(Red, Black, Blue, Brown)
Peel coat	112 sheets x 9	Mask
		*Red for two kind of road and congested area
		*Blue for water area and two kinds of swamp
		*Brown for a dominant tower karst
		*Green for vegetations (thin forest, plantation, etc.)
		*Green for vegetations (dense forest, plantation, etc.)
Strip coat	112 sheets x 9	Mask
		*Red for two kind of road and congested area
		*Blue for eater area and two kind of swamp
		*Brown for a sharp karst topography
		*Green for vegetations (thin forest, plantation, etc.)
		*Green for vegetations (dense forest, plantation, etc.)
Negative film	112 sheets x 7	4 annotation sheets (Red, Black, Blue, Brown)
		2 Symbol sheets (Black, Blue)
		1 Grid sheet (Black)
Positive film	112 sheets x 3	2 Symbol sheets (Black, Blue)
		1 Grid sheet (Black)

3) Procedures

The work flow chart shall be as shown in Fig. 1. Contents of each separation sheet are as follows as per color and material:

a. For black

Scribing sheet	: Neat line, ground features (roads, linear featurs,boundaries, etc.)
Polyester sheet	: Annotation (for Latin alphabet)
	: Vegetation symbols (putting by manual)
	: Hold out mask
Positive film	: Grid, symbol sheets
Negative film	: Annotation, symbol, grid sheets

b. For blue

Scribing sheet	:Water systems (rivers, lakes, etc.)
Polyester sheet	:Annotation of water system (for Latin and Lao alphabet)
	: Hold out mask
Mask sheet	:Water surface, swamps, aquatic plants
Positive film	: Symbol sheets
Negative film	: Annotation, symbol sheets

c. For red

Scribing sheet	: Houses, Buildings
Polyester sheet	: Annotation (for Lao alphabet and hospital symbol)
	: Hold out mask
Mask sheet	: Roads (National roads and paved provincial roads), congested area
Negative film	: Annotation sheet

d. For green

Scribing sheet	: Vegetation boundaries
Mask sheet	: Forests, bushes, bamboos, orchards, plantations

e. For brown

Scribing sheet	: Contour lines, undercut slopes, topography and its symbols
Polyester sheet	: Contour values, relative height of undercut slopes and topographical symbols
	: Hold out mask
Mask sheet	: Sharp karst topography
Negative film	: Contour values, relative height of undercut slope and topographical symbols

4) Planning and preparation

a. Operational manual of drafting shall be prepared and given to cartographers with the necessary instructions.

b. The kind and number of color separation sheets shall be decided for each map sheet.

5) Registration

The final draft of the map is composed of many color separation sheets of scribed sheets, annotation sheets, mask sheets, etc. (more or less 30 different sheets per one map sheet). For the preparation of proof prints, all images shall be printed on the same photo-sensitized sheet one by one in five colors.

To ensure matching among sheets, two register systems shall be adopted.

One is register mark system which has two crosses in the middle of outside of the confronting outer neat line and four corner marks shall be attached at the same place of all sheets to register them each other. Especilly the printed marks is important to register each color image of the map in the process of proof printing and starting of printing.

Another is register pin system which has one pair of holes common to be punched at the same place on the every sheet. Consequently, images of color separation sheets can be matched by two register pins inserted through the holes.

6) Printing of images

Prior to scribing, images of the original manuscript shall be printed on the scribing sheet. Coating diazo sensitizer on a scribing sheet, it shall be exposed to light together with the original manuscript. Images of the original manuscripts shall be printed photographically on it (diazo printing method). On account of the proceeding procedures of plate making and printing, images of the final draft used to be of reverse images before, but recently it is employed the nomal image to take account of the efficiency of its work. The image side of the original manuscript shall be transmited to the scribing sheet so that the images can be nromal. When printing the images, the original manuscript and scribing sheet shall be pinned up together to ensur the images and then the images are printed at the same place with respect to punching holes.

7) Preparation of marginal information sheet and its duplication.

On the marginal information sheet, there are parts common to all the map sheets and parts peculiar to every sheet. The common parts shall be prepared as a prototype and its duplicates shall be made for each sheet. Its duplicates shall be used to make up for the part peculiar of each sheet.

8) Scribing

In reference to the images of the original manuscript exposed on a scribing sheet, printed images shall be scribed separately for each color scribing sheet to obtain the images corresponding to a negative film in photography. When scribing lines or figures, different width of lines shall be obtained in compliance with the specification by using the many kinds of scriber needles.

9) Preparation of mask sheet

The mask to be used to expose only the part necessary to print half-tone screen or zip-a-tone on the printing plate shall be prepared. The material shall be stable polyester sheet coated with shielding film easy to peel off. There are two kinds of coated sheets namely strip coat and peel coat. Either of them shall be selected depending on the complexity of the figures to deal with.

a. strip coat

Laying the strip coat over the scribed sheet, necessary enclosed area shall be peeled off by hands. This coat shall be used when the picked-up area is not complicated.

b. peel coat

When the peel coat is exposed to light with the scribed sheet, the exposed part is eroded and the coat of this part is washed off while processing. In reference to these eroded lines, the enclosed parts shall be peeled off by hands. Unnecessary lines shall be painted out. This sheet is used when the area to be picked up is complicated.

10) Sticking up of annotations and symbols

Specified types and sizes of letters and numerical figures shall be prepared by photo-composing machine and they shall be stuck up on a polyester sheet at specified place in accordance with the specifications of the annotation sheet of the original manuscript of the map.

Two kinds of annotation sheet shall be prepared separately to Latin and Lao alphabet for black and red color. In case of the annotation of water parts, it shall be made in one sheet for blue color.

11) Preparation of positive and negative films

Depending on the preparation procedure of respective sheet, some sheets shall be prepared in positive type of nomal image: for example, marginal information sheet, annotation sheet for vegetation symbols. However, it is necessary to transform them into of negative type of reverse image for the sake of making printing plates after completion of the work.

12) Preparation of proof prints, proof reading and correction of the final draft

After finishing the work, a proof shall be printed and it shall be checked with the original manuscript, as well as the conformity among different sheets, and amendment shall be made for all sheets, when necessary. The proof print shall be prepared by namely "surprint": For the surprint, the first operation is painting. A color sensitizer shall be painted on a polyester sheet. Second operation is multiple printing. Painted polyester sheet shall be exposed to light through several kind of sheet such as scribed, annoted, masked sheets etc. Third operation is a fixing. It shall be operated so that selected color subject can be remained on the polyester sheet by washing and dry up. Those one cycle process shall be proceeded for all colors to replace to another color. Thus the prototype of a map having necessary five colors shall be obtained. In the case of the Study, number of colors to be printed shall be five composing of approximately 30 sheets of color separation sheets, number of sheets per color being approximately six. After several times of proof printing and proof reading, the final proof prints shall be printed.

13) Map sheet name

Map sheet name is as shown in Fig.2.

14) Quality control

After completing the work, checking shall be made for all sheets and a list of quality control shall be prepared.

3. Printing

Printing is the final process of mapping. Prior to the process of printing, the proof shall be prepared to check the matching among each color separation sheet, coloring, etc. After checking and recognition of NGD, the final printing shall be executed. Printing shall be carried out in five colors using a off-set printing machine. The flow chart of plate making and printing is as shown in the Fig. 3

3-1. Work volume

1) For the total of 112 sheets of topographic maps, 1,002 copies shall be printed for each sheet, of which 2 copies each shall be kept in Japan.

2) Partition of colors

The number of colors shall be five colors and their partition shall be as follows:

Color	Contents
Black	Marginal information, planimetry, annotation (Latin alphabet)
Red	Road surface, houses, buildings, annotation (Lao alphabet)
Blue	Water parts, annotation of water parts, aquatic plants
Green	Vegetation boundaries, forests
Brown	Contour lines

3-2. Preparation of films for plate making

Color separation sheets composing one color as elements of the final draft consist of several sheets as shown in Fig. 3. It shall be prepared to combine these sheets to one sheet for one color to take account of the efficiency of plate making for reprinting. As each sheet has been reduced to negative type during the process of the final drafting, the sheets shall be printed on one film superimposing upon each other to produce a positive film of nromal image and then it shall be transformed to a negative film of mirror image by photographic processing. In NGD, the plate making is executed by negative films, for which negative films of mirror images are needed.

3-3. Plate making

Printing plates are prepared by printing the images of the above-mentioned composite of negative films of mirror image on the sensitized aluminum plates by photo-lithography for five colors.

3-4. Proof printing and reading

Proof shall be prepared by printing plates using a flatbed printing machine. It shall be read carefully and plates shall be amended or re-made, when necessary. The final proof shall be confirmed and accepted by NGD.

3-5. Paper to be used

The printing paper shall be of 90 g/m^2 and has the sufficient quality as a map paper in tensile breaking strength, bursting strength, tearing strength and folding endurance as well as of little expansion and contraction. Its size shall be 620 mm length by 620 mm wide

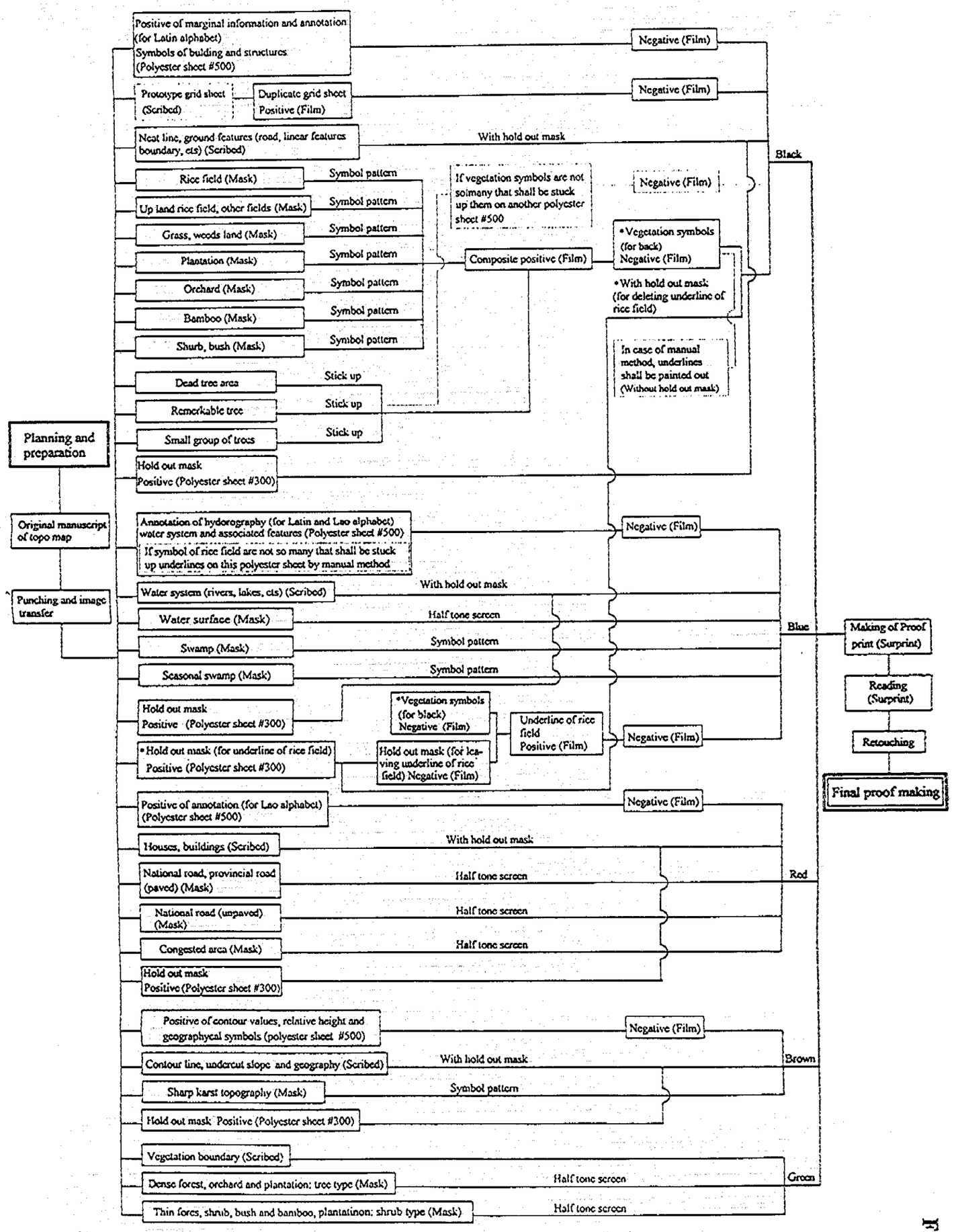
4. Work Schedule

Work schedule is shown in Fig. 4.

5. Reporting

At the end of the fourth year work, the comprehensive report shall be prepared including the the progress and the results of the Study.

Flow chart of Drafting



Symbol of rice field is shown by two colors, upper arrow part is black, lower underline part is blue.

Symbol pattern <-> *Zip-a-tone*

Fig. 1

Fig. 2

INDEX MAP FOR CARTOGRAPHIC AND SHEET NUMBER

52-A-a ບ. ຫາດຄຳ B. HATKHAM	52-A-b ບ. ໂພນທອງ B. PHONTHONG	52-B-a ບ. ຫາດປາອໍ B. HATPA-O	52-B-b ພູ ນ້ຳໂພຍ PHOU NAMPHOY
52-A-c ນ້ຳ ງຽບ NAM NGIAP	52-A-d ບໍ່ສີຄັນ BOUKHAN	52-B-c ບ. ນາໂອ B. NA-O	52-B-d ພູ ເມີຍ PHOU MUAY
52-C-a ບ. ຕ່າກົກແຄນ B. THAKOKKHEN	52-C-b ບ. ຫ້ວຍຄູນ B. HOUAYKHOUN	52-D-a ບ. ຫນອງບົວ B. NONGBOUA	52-D-b ບ. ບໍ່ທຽນ B. BOTHUN
52-C-c ບ. ກວ້ຍ B. KOUAY	52-C-d ປາກຊັນ PAKXAN	52-D-c ບ. ສີນໄຊ B. SINXAI	52-D-d ບ. ບົງ B. BONG
		64-B-a ບ. ແກ້ງສະດອກ B. KENGSADOK	64-B-b ປາກກະດິງ PAKKADING

53-C-a ສາຍພູ ຕາລາບັດ SAYPHOU TALABAT	53-C-b ນ້ຳ ເຕັກ NAM TEK	53-D-a ບ. ສີບງອນ B. SOPNGOM	53-D-b ບ. ຫ້ວຍໄຄ້ B. HOUAYKHAI	54-C-a ບ. ກົກເຂືອ B. KOKDUA	54-C-b ບ. ຄຳຄູນາ B. KHAMKHOUNA	54-D-A ບ. ກົກເຂືອງ B. KOKKHUANG	54-D-b ບ. ສີບຈາດ B. SOPCHAT
53-C-c ບ. ປາກປ່າງ (2) B. PAKPANG (2)	53-C-d ສາຍພູ ແປກ SAYPHOU PEK	53-D-c ສາຍພູ ອ່າວ SAYPHOU AO	53-D-d ບ. ຫິນໂງ່ນ B. HINNGON	54-C-c ບ. ຊຽງແມນ B. XIANGMEN	54-C-d ບ. ກົກເມືອງ B. KOKFUANG	54-D-c ນ້ຳ ກະມັງ NAM KAMANG	54-D-d ບ. ສີມມອງ B. SOMMONG

65-A-a ບ. ໂພນສີ B. PHONSI	65-A-b ສາຍພູ ຜາເປັດ SAYPHOU PHAPET	65-B-a ພູ ຜາມ້ອງ PHOU PHAMONG	65-B-b ນ້ຳ ກະດິງ NAM KADING	66-A-a ບ. ນາດີ B. NADI	66-A-b ບ. ນາປ່າຫວ້ານ B. NAPAVAN	66-B-a ບ. ກະອານ B. KA-AN	66-B-b ບ. ນາຂວັນ B. NAKHOUAN	67-A-a ບ. ນາແປ B. NAPE
65-A-c ບ. ຊອດ B. XOT	65-A-d ບ. ນາເຄືອໃນ B. NAKHUA - NAI	65-B-c ພູ ໄມ້ຊາງ PHOU MAIXANG	65-B-d ຜາ ມ່ານ PHA MAN	66-A-c ບ. ລາດມ່ວງ B. LATMOUANG	66-A-d ບ. ໂພນຕານ B. PHONTAN	66-B-c ບ. ປ້ອມແປກ B. POMPEK	66-B-d ຄຳເກີດ KHAMKEUT	67-A-c ບ. ພູຫິນສໍ B. PHOUHINSO

65-C-a ບ. ຂອນຂວາງ B. KHONKHOUANG	65-C-b ບ. ຫນອງບົວ B. NONGBOUA	65-D-a ບ. ວຽງຄຳ B. VIANGKHAM	65-D-b ບ. ຫຼັກ 28 B. LAK 28	66-C-a ບ. ຕ່າ B. THA	66-C-b ບ. ແກ້ງກາງ B. KENGKANG	66-D-a ບ. ຜາເມືອງ B. PHAMUANG	66-D-b ບ. ຄຳມ່ວນ B. KHAMMOUAN	67-C-a ບ. ໂພນໄຊໃຫຍ່ B. PHONXAI-GNAI	67-C-b ບ. ໂພນຄູນ B. PHONKHOUN	67-D-a ນ້ຳ ໂຊດ NAM XOT
	65-C-d ບ. ປາກທອນ B. PAKTHON	65-D-c ບ. ນ້ຳທອນ B. NAMTHON	65-D-d ບ. ຫ້ວງລົມ B. THONGLOM	66-C-c ບ. ນາເມືອງ B. NAMUANG	66-C-d ບ. ນາກາງ B. NAKANG	66-D-c ສາຍພູ ໄຮ SAYPHUO HAI	66-D-d ບ. ນາຫວ່າ B. NAVA	67-C-c ບ. ໂພນສະອາດໃຫ່ ... B. PHONSA-AT-MA	67-C-d ບ. ພູພຽງ B. PHOUPHIANG	67-D-c ພູ ກວນກະລອງ PHOU KOUNKALONG

77-A-b ບ. ບຸ້ງກວາງ B. BOUNGKOUANG	77-B-a ບ. ນານ້ຳ B. NANAM	77-B-b ບ. ຕ່ານານເຫນືອ B. THANA-NUA	78-A-a ບ. ບໍ່ແນ່ງ B. BONENG	78-A-b ບ. ອໍ B. O	78-B-a ບ. ນາຫ້ວ B. NAHUANG	78-B-b ບ. ສີບນຽນ B. SOPNIAN	79-A-a ບ. ນ້ຳນຽນ B. NAMNIAN	79-A-b ບ. ນາວັງ B. NAVANG	79-B-a ບ. ໃຫ່ B. MAI
		77-B-c ບ. ພົງ B. PHONG	77-B-d ບ. ຊາງ B. XANG	78-A-C ບ. ບໍ່ໂພນຫຼົ່ວ B. BOPHONTIOU	78-A-d ບ. ຫົວນາ B. HOUANA	78-B-c ບ. ນາໂທນ B. NATHON	78-B-d ນ້ຳ ເທີນ NAM THEUN	79-A-c ບ. ຕ່າລັ່ວ B. THALANG	79-A-d ພູ ກະແຕເນືອ PHOU KATE-NUA	79-B-c ບ. ຄມາກເມືອງ B. KAKFUANG

79-C-a ບ. ນາກາຍໃຕ້ B. NAKAY-TAI	79-C-b ບ. ນາກາຍເໜືອ B. NAKAY-NUA	79-D-a ບ. ເປົ່ງ B. PEUNG	79-D-b ບ. ຄອງ B. TONG	80-C-a ພູ ຈ້ວ PHOU YANG
79-C-c ບ. ຕົ້ງ B. THONG	79-C-d ນາກາຍ NAKAY	79-D-c ບ. ດອນ B. DON	79-D-d ນ້ຳ ນອນ NAM MON	80-C-c ນ້ຳ ຍັ NAM YANG
91-A-a ບ. ວັງຢຽນ B. VANG-YIAM	91-A-b ຍົນນະລາດ GNOMMALAT	91-B-a ບ. ນາທຶດ B. NATHEUT	91-B-b ບ. ຫາງການ B. HANGKAN	92-A-a ບ. ຊຽງດາວ B. XIANGDAO
91-A-c ບ. ມ່ວງໄຊ B. MOUANGKHAI	91-A-d ບ. ດອນເບີ້ຍ B. DONPUAY	91-B-c ບ. ໂພນສະຫວ່າງ B. PHONSAVANG	91-B-d ບ. ເຫືອນ B. TUAN	92-A-c ບ. ບຶງ B. BUNG

Fig. 3

Flow chart of Printing

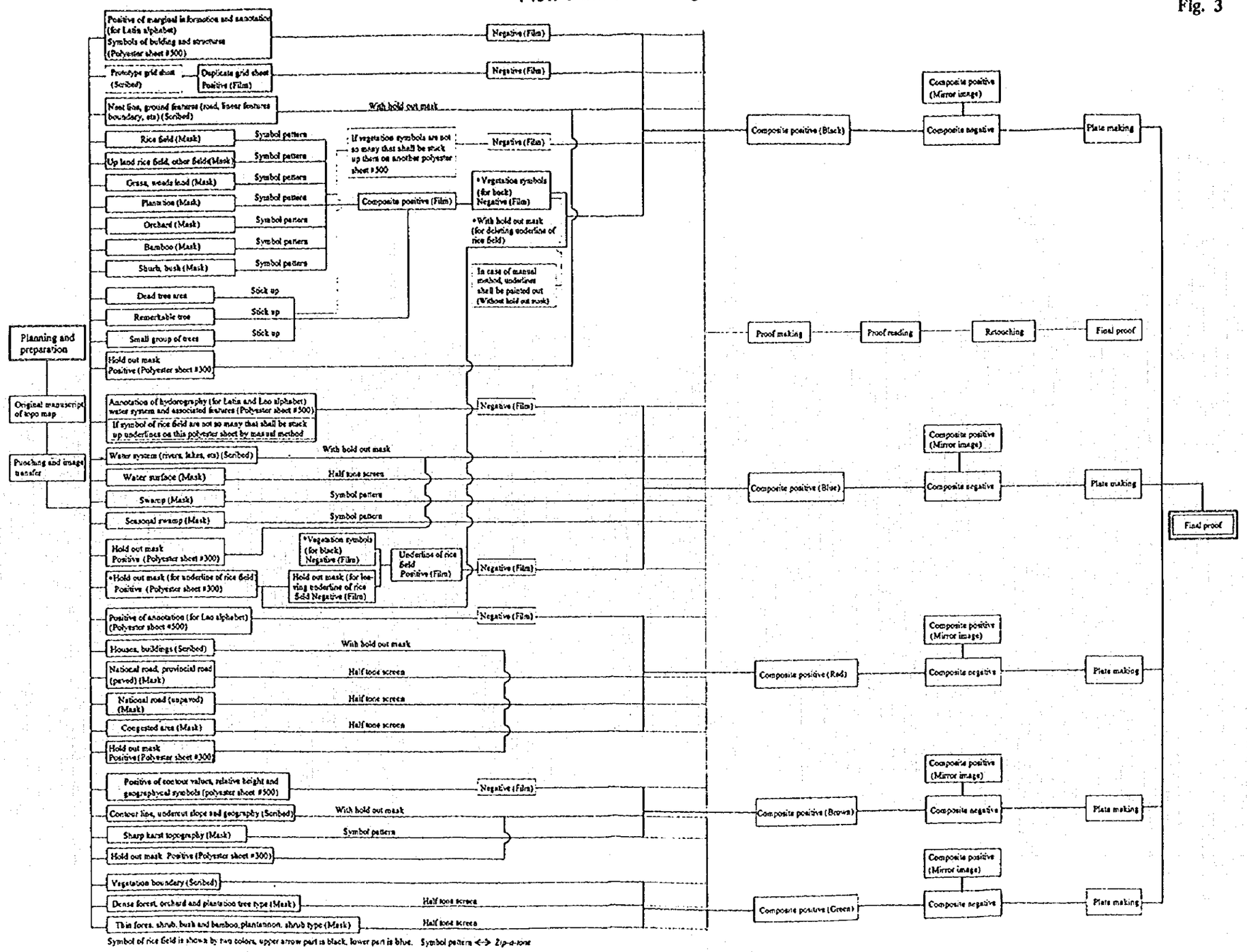
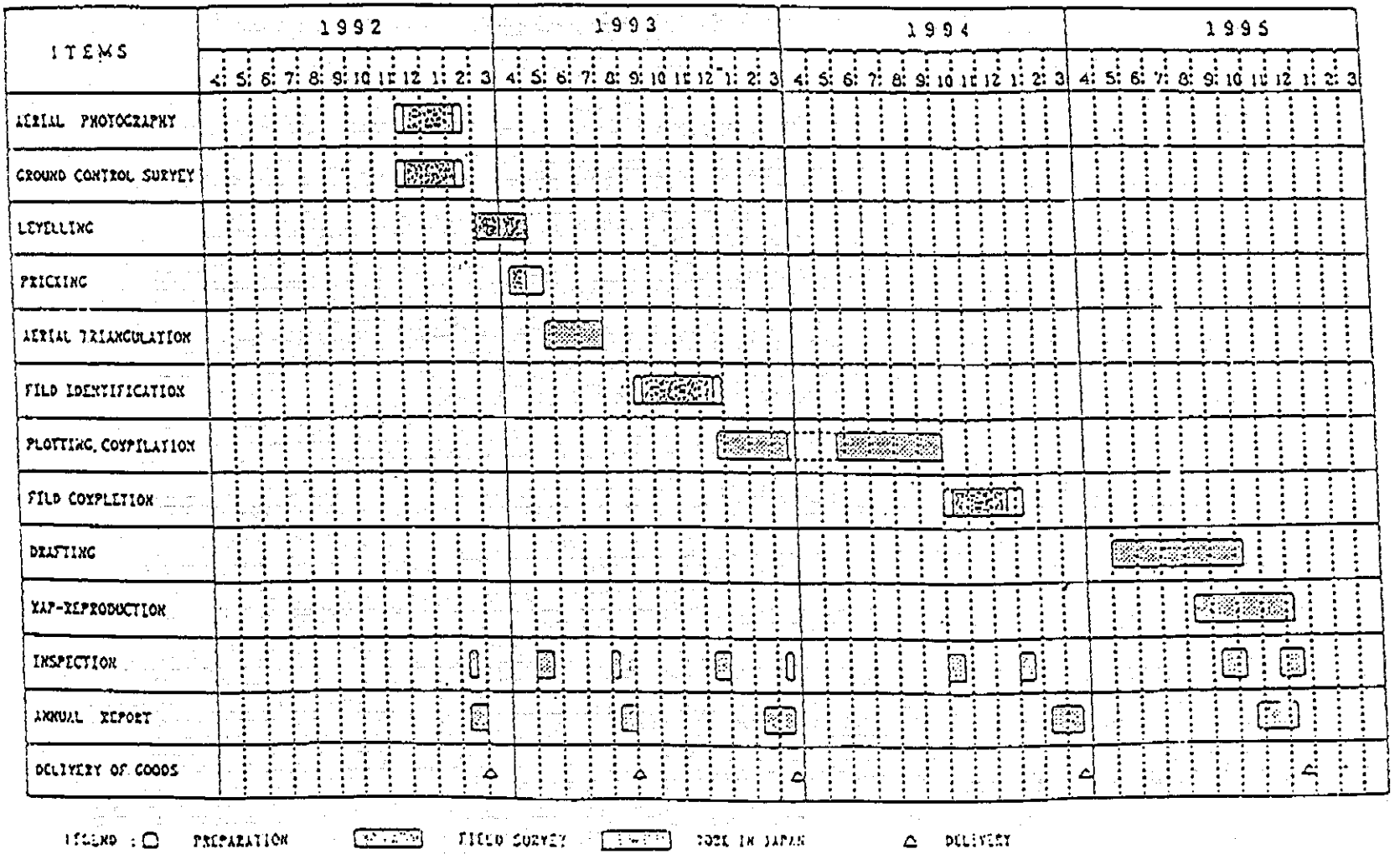


Fig. 4 WORKING SCHEDULE



Appendix 1

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
ROAD AND ASSOCIATED FEATURES	1	National road	(a) (b) (c) 0.15mm 13 40% 15% 4.0mm 3.0mm 0.7mm	(mm) 0.1 0.15	Black Red (half tone 15%, 40%)	NR(a) NR(b) NR(c) 13 0.7mm Black	• Road route number is indicated on the road line. (a) Paved road. (b) Not paved. Road width ≧ 5m. (c) Not paved. Road width <5m.
	2	Provincial road Vehicles passable at all seasons. Width: More than 5m.	(a) (b) 40% 0.4mm	0.1	Black Red (half tone 40%)	PR(a) PR(b) 0.4mm Black	(a) Paved road. (b) Not paved. • More than 10m width: Actual width shall be indicated. • Enough condition for 2WD passage.
	3	Provincial road Vehicles passable at all seasons. Width : 2.5–5m.		0.25	Black	Red	
	4	Provincial road Vehicles passable in dry seasons.	1.0mm 3.0mm	0.25	Black	Red	• Any width.
	5	Foot path	0.5mm 1.5mm	0.15	Black	Red	
	6	Under construction road	1.0mm 3.5mm	0.1	Black	Black	• Except national road • Length: More than 1cm on the map. • In the provincial road. • Width : More than 5m
	7	Cutting	0.15mm 1.0mm 0.1mm	0.1 0.15	Black	Green Black	• Gradient: More than approx. 45° (1:1). • Length: Longer than 1cm on the map. • Height difference: More than approx. 3m.
	8	Embankment	1.0mm	0.1	Black	Green Black	• Gradient: More than approx. 30° (1:2). • Length: Longer than 1cm on the map. • Height difference: More than approx. 2m.
	9	Revetment	2.0mm 0.1mm ϕ0.30 mm ϕ0.18 mm	0.1	Black	Black	• Concrete, stone etc., • Length: Longer than 1cm on the map. • Height difference: More than 2m.

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specifications
ROAD AND ASSOCIATED FEATURES	10	Range of trees	2.0mm 0.6mm	(mm) 0.1	Black	Black	· Tree height: More than about 10m. · Length: Longer than 2cm on the map.
	11						
RAIL WAY	12	Railway					
	13	Railway station					
TRANSMISSONS	14	Power transmission line	(a) 5.0mm 5.0mm 0.4mm 0.6mm (b) 1.0mm 0.5mm φ0.4 mm	0.1	Black	(a) (b) Black	(a) Tower type. (b) Pole type.
	15	Telecommunication line	5.0mm φ0.4 mm	0.1	Black	Black	· More than 20 circuit lines.
	16	Power station				Black	

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	color	Compilation	Specificatio
WATER AND ASSOCIATED FEATURES	21	River , stream, direction of flow	0.3mm 0.15mm 0.3mm 0.1mm 3.5mm	(mm) 0.1 0.15 0.3	Blue Black	Bluee	• Double line ≧ 10 m > Single line. • Single line a: 5m~10m. • Single line b: less than 5m.
	22	Underground river & stream		0.2	Blue Black	Blue	• Minimum size 0.8 ϕ half circle.
	23	Intermittent stream & pond	0.5mm 1.5mm	0.1	Blue	Blue	• Double line ≧ 10m > Single line.
	24	Canal ,drainage canal, ditch	15 0.2mm 6 0.1mm	0.1 0.2	Blue	15 6 Blue	W ≦3.4m : Single line. W ≧ 3.5m : annotate width in metre. 3.5~4.4 = 4m, 10.5~11.4 = 11m.
	25	Underground canal / ditch	0.5mm 1.5mm	0.1	Blue	Blue	• Double line ≧ 3.5m > Single line.
	26	Culvert	1.2mm 80°	0.15	Black	Black	• Including small bridge (length < 3m).
	27	Water pipeline	(a) 6.5mm ϕ0.5 mm (b) 2.5mm 1.0mm 6.5mm	0.1	Blue	(a) (b) Blue	(a) On the ground. (b) Underground. • Not necessary oil, gas pipe line.
	28	Concrete or stone revetment	2.0mm 0.1mm ϕ0.30 mm ϕ0.15 mm	0.1	Black	Black	• Length: Longer than 1cm on the map. • Height difference: More than 2m.
	29	Embankment	1.0mm 0.1mm 0.15mm	0.1 0.15	Brown	Black	

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
WATER AND ASSOCIATED FEATURES	30	Undercut slope	0.1mm, 0.15mm, 12 (Brown), 1.0mm	(mm) 0.1 0.15	Brown	Green, 12 .. Red, Black	• Height difference: More than 3m, and indicates △h in metre (To be measured by stereo-plotters at 2-3km each). • Length: Longer than 1cm on the map. • Put on relative height
	31	Spring	1.0mm, 1.5mm		Blue	Blue	• Natural condition: Only symbol. • Permanent revetment: With annotation. • Hot spring: With annotation. Note, Concrete bridge: Cm.P. Metal bridge: L Wooden bridge: M (length) 130-8 (width in metre) / 20 (capacity tons)
	32	Reservoir, pond, fish pond		0.1	Blue	R, P, F, Blue	• Minimum size: 2×2mm on the map and notes the name if there are.
	33	Water tower / tank	2.2mm, 0.9mm		Black	Black	• Height difference: More than 5m.
	34	Water pool Well Pump	0.7mm, φ0.2mm 1.2mm, φ0.6mm 1.2mm	0.12	Blue	Blue	• Water pool (on the ground and under ground). • Pump up. • Well (perennial).
	35	Water fall	N.Tt. 5, 1.5, N.Tt. 10	0.2	Blue	N.Tt. 5, N.Tt. 10, Blue	• Height difference: More than 3m. • Note add: height difference & N. Tt. • (To be measured by stereo-plouers).
	36	Rapid	Keng, 1.5, 0.7mm, 0.5mm	0.2	Blue	Keng, Blue	
	37	Dam dam length ≧ 50m	(a), (b), Cm.P.80-6, F.D.70-6	0.1	Black	(a), (b), Cm.P.80-6, F.D.70-6, Black	(a) Vehicles passable, note: Concrete dam: Cm.p. Earth, Soil dam: F. D. (b) Vehicles not passable. 110-6 ← Top(head)width. ↑ dam length in metre.
	38	Small dam dam length<50m	0.3mm	0.1	Black	Black	

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
WATER AND ASSOCIATED FEATURES	39	Ford (seasonal)	(a) (b) (c) 1.0mm 0.5mm 0.2mm	(mm) 0.1 0.25	Black	(a) (b) (c) Black	(a) Vehicles passable in dry season. (b) -ditto- (c) Vehicles not passable in dry season.
	40	Bridge	Cm.P. 80-8 / 20 0.2mm	0.1	Black	Cm.P. 80-8 / 20 Black	• Vehicles passable. • length >3m
	41	Foot bridge	0.4mm 90° 0.1mm 0.25mm	0.1 0.25	Black	Black	• Vehicles not passable.
	42	Ferry	1.6mm 0.9mm Boc	0.1	Black	Boc Black	
	43	Port, pier	1.0mm φ0.5 mm 3.0mm	0.12	Black	Black	
	44	Water gauge station	3.0mm S.L.V. 0.45mm		Black	S.L.V. Black	
FENCE	51	Concrete fence, brick fence, etc.	1.0mm 0.2mm	0.2	Black	Black	• Length: Longer than 2cm on the map. • Not necessary along the single line road.
	52	Iron net fence, bamboo fence, etc.	3.0mm 1.5mm 0.7mm	0.1	Black	Black	• Length: Longer than 2cm on the map. • Not necessary along the road. • not temporary

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
BUILDINGS AND STRUCTURES	61	Houses	0.4mm 0.6mm	(mm)	Red	Black	• Minimum size: 0.4×0.6mm on the map. • Special square house: 0.4×0.4mm or actual size on the map.
	62	Congested area	half tone 20% 0.1mm	0.1	Red	Black	
	63	Buildings	0.2mm 0.3mm 0.06mm	0.2 0.08	Red	Brown Black	• Note the name if there are.
	64	Provincial office	2.5mm φ1.0mm		Black	Red	• Symbolize.
	65	District office	2.5mm φ1.0mm		Black	Red	• - ditto -
	66	School	0.8mm 0.5mm 1.0mm 2.5mm 1.0mm		Black	Red	• Primary junior high school and high school, universities. • Not necessary kindergarten. • Symbol is indicated on the center of area.
	67	Telephone & telegraph office	P.T.T.		Black	P.T.T. Red	• Annotation indicate beside of house symbol.
	68	Post office	P.T.T.		Black	P.T.T. Red	- ditto -
	69	Big market	Tl.		Black	Tl. Red	• With annotation. • Not necessary limit.

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
BUILDINGS AND STRUCTURES	70	Hospital	2.0mm 2.5mm 0.6mm	(mm) 0.12	Red	Red	· Not necessary clinic, dispensary.
	71	Temple, pagoda	1.2mm 2.5mm 1.5mm		Black	Red	
	72	Christian church	1.0mm 1.0mm 2.5mm 1.0mm	0.12	Black	Red	
	73	(a)Airport, airfield (b)Airfield	(a) 3.2mm (b) 0.1mm 3.2mm	0.1 0.2	Black	Black	(b) With control tower & concrete landing strip. (c) Others.
	74	Stadium	0.4mm	0.1	Black	Black	· Including rugby, soccer ground etc.
	75	Big factory, plant	2.5mm		Black	Red	
	76	Sawmill, material yard	2.5mm	0.1	Black	Red	· Not necessary timber yard with small house.
	77	Oil storage plant	1.5mm	0.1	Black	Red	· Not necessary limit.
	78	Gasoline station	1.5mm 2.5mm 0.8mm	0.1	Black	Red	· Big or marked station for driver.

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
BUILDINGS AND STRUCTURES	79	Monument	2.5mm 1.5mm	(mm) 0.12	Black	Red	
	80	Statue,historic spot	1.0mm 1.5mm	0.12	Black	Red	
	81	Cemetery	0.4mm 0.8mm 0.12mm 0.1mm 1.5mm	0.1 0.12 0.4	Black	Red Green	• Small graveyard. • Big cemetery with limit.
	82	Chimney				Black	• More than about 15m height.
	83	Tower of radio / TV	1.5mm 2.5mm	0.12	Black	Black	
	84	Power substation	1.5mm 2.5mm	0.12	Black	Red	• Main transmission voltage: More than 20kv.
	85	Meteorological station	1.5mm 90° 2.5mm 1.0mm	0.12	Black	Red	
	86	Mines	1.5mm 0.4mm 2.5mm 2.5mm	0.12	Black	Red	• With annotation.
	87	Quarry site	0.15mm 0.1mm 1.0mm 1.0mm 1.0mm	0.1 0.15	Black	Black	

Map symbols and their application rule

	No.	Designation	Symbol	Line Size (mm)	Color	Compilation	Specification
CONTROL POINTS	91	Secondary travers point	1.5mm △ 123,4 φ0.2mm	0.12	Black	△ 123,4 Black	• Not necessary A.M.S. triangulation points.
	92	Secondary bench mark	1.2mm ⊗ 123,4	0.12	Black	⊗ 123,4 Black	
	93	GPS control point	1.5mm △ 123,4 φ0.2mm	0.12	Black	△ 123,4 Black	• Parmanent monument.
	94	Temporary bench mark	• 123,4 φ0.2mm		Black	• 123,4 Black	• Temporary marked.
	95	Spot height	• 123 φ0.3mm		Black	• 123 Black	• To be measured by plotting instruments in metre. • 5~10 points in 100 cm²(10 × 10 cm) on the map.
	96	Water surface elevation	• 123 φ0.8mm	0.1	Blue	• 123 Blue	

Map symbols and their application rule

	No.	Designation	Symbol	Line Size (mm)	Color	Compilation	Specification
VEGETATIONS	101	Vegetation boundary		0.1	Green	Green	
	102	Dense forest			Green (half tone 40%)	Black Green	
	103	Thin forest			Green (half tone 20%)	Black Green	
	104	Rice field	Black 0.7mm 1.6mm 2.0mm 0.9mm Blue	0.12	Black Blue	Black Green	• Minimum area: approx. 1ha.
	105	Upland rice field, other fields	0.7mm 1.6mm	0.12	Black	Black Green	-ditto-
	106	Grass, weeds land	10.0mm 5.0mm 0.7mm 0.5mm	0.12	Black	Black Green	-ditto-
	107	Plantation	φ0.3mm 4.0mm 1.6mm 5.0mm	0.12	Black	Black S. Mon. Green	Limitation of area: approx. 1cm² on the map. S. Mon: Mulberry. S. Oy: Sugar cane. S. Cafe: Coffee. S. N : Pineapple. S. Ys : Tobacco. S. K :Banana. S. Ng : Kapok.
		-ditto-				(a) (b) (c)	(b)Tree type plantation.(with 40% half tone) (c)Scrub type plantation.(with 20% half tone) (d)Grass type plantation.(without half tone)
	108	Orchard	3.0mm 3.0mm φ0.5mm	0.1	Black Green (half tone 40%)	Black Green	• Minimum area: approx. 1cm² on the map.

Map symbols and their application rule

	No.	Designation	Symbol	Line Size	Color	Compilation	Specification
VEGETATIONS	109	Bamboo area	1.0mm 1.7mm	(mm) 0.12	Black Green (half tone 20%)	Black Green	• Minimum area: approx. 1cm² on the map. •
	110	Shrub, bush	φ0.3mm φ0.5mm	0.12	Black Green (half tone 20%)	Black Green	- ditto -
	111	Dead trees area	0.7mm 0.7mm 1.4mm 0.5mm	0.12	Black	Black Green	- ditto -
	112	Remarkable tree	(a) 0.8mm 2.5mm (b) 0.8mm 2.5mm 0.5mm	0.12	Black	(a) (b)	(a)Broad leaf tree. (b)Conifer tree.
	113	(a)Small group of tree (b)Isolated Trees	(a) 0.9mm 1.0mm (b) φ0.6 mm	0.12	Black	(a) (b)	(a)Small area in the cultivated land. (b)Only one or two tree.
	114	Seasonal swamp	0.7mm	0.1	Blue	Green Blue Black	• Minimum area: approx. 1cm² on the map. •
	115	Swamp	0.7mm 0.1mm	0.1	Blue	Black Blue Green	- ditto -
LANDSCAPE	116	Sand terrain		φ0.1 φ0.3	Brown	Black Green	- ditto -
	117	Gravel terrain	0.7mm 0.5mm	φ0.1 φ0.3	Brown	Black Green	- ditto -

Map symbols and their application rule

	No.	Designation	Symbol	Line	Color	Compilation	Specification
GEOGRAPHY	121	Monolith, scattered rocks rock outcrop	0.7mm 0.5mm	(mm)	Brown	Black	
	122	(a) Rock wall, cliff (b) Accumulated stones	(a) 0.15mm 1.0mm (b) 0.1mm	0.1 0.15	Brown	(a) Black (b) Green	• Length: Longer than 1cm on the map.
	123	Earth crumbling	0.15mm 1.0mm 0.1mm	0.1 0.15	Brown	Black Green	- ditto -
	124	Rain gully, ravine	0.15mm 1.0mm 0.1mm	0.1 0.15	Brown	Green Black	- ditto -
	125	Rocky terrain(bare)	• Only contour line.			Red (R) Green	• Minimum area: approx. 1cm² on the map.
	126	Rocky terrain (thin forest)	• Contour line and something vegetation symbols, without green half tone.			Red (RT) Green	• Minimum area: approx. 1cm² on the map.
	127	Sharp karst topography	• Contour line and symbol pattern.		Brown	Red (尖) Green	• Minimum area: approx. 1cm² on the map.
	128	Isolated stick rock	2.0mm 554 2.0mm 1.5mm 6 1.0mm		Black	554 6 Black	• With height difference in metre (To be measured by stereo-plotters).
	129	Small hill	0.3mm	0.08	Brown	Brown	• Symbolize.

Map symbols and their application rule

	No.	Designation	Symbol	Line	Color	Compilation	Specification
GEOGRAPHY	130	Hole		(mm) 0.08	Brown	Brown	• Symbolize.
	131	Cavern	1.0mm 2.3mm	0.2	Black	Brown	
	132	Contour line, Contour line value	100			100	• To be continued on the road, house and intermittent river. • Density of contour value: In mountains area: 4~5 values in 100cm² on the map. In flat area: 2~3 values.
BOUNDARIES	141	International boundary	1.6mm φ0.5 mm 0.6mm 0.12mm 2.5mm 2.5mm	0.6 0.12	Black	Brown	• Drawing by NGD.
	142	Provincial boundary	0.4mm 2.0mm 2.5mm φ0.3 mm	0.4	Black	Brown	• Ditto •

Appendix 2

The Topographic Mapping of Bolikhamxai province (1/25,000)

Classification for Annotation Codes

City & Village

Code No	Designation	Style (Latin)	Style(Lao)	Height (mm)
100	Metropolis (VIENTIANE)	CENTURY BOLD E01-44 CAP	Alice_5 Regular	5.0
101	Capital of province	CENTURY BOLD E01-44 CAP	Alice_5 Regular	4.0
102	Capital of District	UNIVERS 57 E102-22 CAP	Alice_5 Regular	2.8
103	Village	Univers 57 E102-22 min	Alice_5 Regular	1.8
111	Abandoned village	*Century Old Italic* E01-25 min	Alice_5 *Italic*	1.8
112	Annotation for Buildings	Univers 45 E102-14 min	Alice_5 Regular	1.5
121	Island	Century Light E01-04 min	Alice_5 Regular	1.8

Regional name (Plain , Plateau , Range etc.)

Code No	Designation	Style (Latin)	Style(Lao)	Height (mm)
201	More than 40km²	*UNIVERS 56* E102-25 CAP	Alice_5 *Italic*	4.2
202	20~40km²	*UNIVERS 56* E102-25 CAP	Alice_5 *Italic*	3.5
203	8~20km²	*UNIVERS 56* E102-25 CAP	Alice_5 *Italic*	2.5
204	4~8km²	*UNIVERS 56* E102-25 CAP	Alice_5 *Italic*	2.0
205	Less than 4km²	*UNIVERS 56* E102-25 CAP	Alice_5 *Italic*	1.8

Mountain

Code No.	Designation	Style (Latin)	Style(Lao)	Height (mm)
301	More than 1,000m height , Prominent Mt.	*Univers 56* E102-25 min	Alice_5 *Italic*	2.5
302	More than 500m height	*Univers 56* E102-25 min	Alice_5 *Italic*	2.2
303	Less than 500m height	*Univers 56* E102-25 min	Alice_5 *Italic*	2.0
304	Hill	*Univers 56* E102-25 min	Alice_5 *Italic*	1.8

River , Lake etc.

Code No.	Designation		Style (Latin)	Style (Lao)	Height Latin (mm)
	River	Lake, pond			
400	Mekong river		*CENTURY OLD ITALIC* E01-45 CAP	Alice_5 *Italic*	5.0
401	More than 10 mm width on the map	More than 4 km²	*Century Old Italic* E01-45 min	Alice_5 *Italic*	3.0
402	4 mm ~ 10 mm width on the map	1 ~ 4 km²	*Century Old Italic* E01-45 min	Alice_5 *Italic*	2.5
403	Less than 4 mm width on the map	25 ha ~ 1 km²	*Century Old Italic* E01-45 min	Alice_5 *Italic*	2.0
404	Small river (5 m ~ 10 m)	4 ha ~ 25 ha	*Century Old Italic* E01-45 min	Alice_5 *Italic*	1.8
405	Stream (less than 5m width)	less than 4 ha	*Century Old Italic* E01-45 min	Alice_5 *Italic*	1.5
410	Prominent objects		*Century Old Italic* E01-45 min	Alice_5 *Italic*	1.5

Control point

Code No.	Designation	Style (Latin)	Style(Lao)	Height (mm)
501	Secondary traverse point Monumented GPS control point			2.0
502	Secondary bench mark			2.0
503	Unmonumented GPS control ponit			2.0
504	Temporary bench mark			1.8
505	Spot elevation (ground)			1.8
506	Spot elevation (water surface)			1.8
507	Height difference (relative height)			1.8
508	Contour line value			1.5

Marginal information

Code No	Designation	Style (Latin)	Style(Lao)	Height (mm)
601	Thong , Khok , Na	*Century Old Italic* E01-25 min	Alice_5 *Italic*	1.5
602	Structures :bridge , dam etc.	Univers 57 E102-22 min		1.5
603	Structures (hydro) :ford , gauging st. etc.	*Century Old Italic* E01-25 min		1.5
611	Map title	CENTURY BOLD E01-44 CAP	Alice_5 Regular	4.2
612	Name of map sheet	CENTURY BOLD E01-44 CAP	Alice_5 Regular	3.5
613	Destination annotation	Century Light E01-25 min		1.5
614	Legend (Title)	CENTURY BOLD E01-44 CAP	Alice_5 Regular	3.0

a) ຈຸດປັນເຖານຕາງຂວາງ ; ແ) ຫຼັກໝາຍລະດັບ
a) Horizontal control point ; b) bench mark

a) ເຮືອນ ; ແ) ບ່ວນທີ່ເປີດໂລດ້ານ້ຳ ; c) ເຮືອນກໍ່
a) Houses ; b) congested area ; c) buildings

a) ໂຮງຮຽນ ; ແ) ສະນາມ , ສະຖານທີ່ປະວັດສາດ
a) School ; b) stadium , historic spot

a) ໂບດຄຣິດສະຕຽນ ; ແ) ວັດ
a) Christian church ; b) temple , pagoda

a) ປ່າຊ້າ ; ແ) ອະນຸສາວະລີ
a) Cemetery ; b) monument

a) ສະໜາມບິນ ; ແ) ດາດສະໜາມ
a) Airport ; b) airfield

a) ຫໍຄວບຄຸມ ໂທລະພາບ ; ແ) ສະຖານີຈ່າຍກະແສໄຟຟ້າ
a) Tower of radio / TV ; b) power substation

a) ອ່າງເກັບນ້ຳ ; ແ) ສະຖານີຄຸມ້ນ້ຳ
a) Water tower / tank ; b) meteorological station

a) ຄັງເກັບນ້ຳມັນເຊື້ອໄຟ ; ແ) ປັ້ມນ້ຳມັນ
a) Oil storage plant ; b) gasoline station

a) ຫ້ອງການຫົວໜ້າແຂວງ ; ແ) ຫ້ອງການຫົວໜ້າເຂດ
a) Provincial office ; b) district office

a) ສາຍໄຟຟ້າແຮງສູງ ; ແ) ຫຼັກເຫຼັກໃຫຍ່ ; ແ) ຫຼັກທ່ານວກ
b) Power transmission line ; a) tower type ; b) pole type

ສາຍโทรศัพท์ ; Telecommunication line

a) ເສັ້ນທາງແຫ່ງຊາດ
Natural road : a) paved , 8 - route number ;
b) unpaved (width more than 5 m) ;
c) unpaved (width less than 5 m)

a) ເສັ້ນທາງແຂວງ
Provincial road : a) paved ;
b) unpaved (all weather , width more than 5 m) ;
c) unpaved (all weather , width 2.5 - 5 m) ;
d) unpaved (seasonal)

ທາງຍ່າງ
Footpath

a) ທາງຄັນຄູ ; b) ທາງຂ້ຽນ , c) ຫໍ່ລະລາທາງ
a) Embankment ; b) cutting ; c) culvert

a) ທໍ່ນ້ຳບ້ຳ : a) ເຊິ່ງພະນ້ຳດິນ ; b) ໃຕ້ດິນ
b) Water pipeline : a) on the ground , b) underground

a) ນ້ຳສ້າງ ; b) ຈັກສູບນ້ຳ ; c) ຄ່ານ້ຳ , d) ນ້ຳອອກ
a) Well ; b) pump , c) water post ; d) spring

a) ຄອງຊົນລະປະທານ , 8 - ຄວາມກວ້າງ ເປັນ ແມັດ ;
b) ຮ່ອງ ; c) ແຖວຄົ້ນໄມ້
a) Canal , 8 - width in meters ; b) ditch ; c) range of trees

ແມ່ນ້ຳ , ຫ້ວຍ , ສະບອງ ; a) ມີນ້ຳຫລາຍປີ ; b) ມີນ້ຳຍາວລະດູ
River , stream , pond : a) perennial ; b) intermittent

a) ນ້ຳຕົກຫາດ , 5 - ຄວາມສູງ ເປັນ ແມັດ ; b) ແກ່ງ
a) Water fall , 5 - relative height in meters ; b) rapids

ຈົວ (ທາງເວົ້າ 3 ແມັດ)
Bridge (length more than 3 m) ,
Cm.P. - materials (Cm.P. - concrete , L - metal , M - wooden) ;
130 - length , 6 - width in meters , 60 - capacity of charge in tons

ຈົວລ່ຽວຄົນໄຕ້ຈ້ານ
Footbridge

ທາລຸ(ສ້ານ) (ທາງລະນຸ)
Furu (seasonal)

ທ່າເຮືອ
Port , pier

ທ່າຂ້າມ , ເຮືອຂ້າມ
Ferry

ທິດທາງນ້ຳໄຫຼ
Direction of flow

ສະຖານີວັດແທກລະດັບນ້ຳ
Water gauge station

ເຂື່ອນກັກນ້ຳ : a) ລົດໄປໄດ້ , b) ລົດໄປບໍ່ໄດ້
Dam : a) vehicle passable ; b) vehicle impassable ;
Cm.P. - materials (Cm.P. - concrete , F.D. - earthen) ;
150 - length , 8 - width in meters

a) ຄ້ຽນ້ຳ , 8 - ຄວາມສູງ ເປັນ ແມັດ ,
b) ກ້ານແຈງ , ຫີ ກ້ອນຫີນກັ້ນຕາຝັ່ງ , ເຈ້ນ
a) Underflow slope , 8 - relative height in meters ;
b) concrete or stone revetment

ເຄື່ອງໝາຍ
L E G E N D

- ▲ 25 — ຫີນແຂ່ງ ,25 - ຄວາມສູງ ເປັນແມັດ
  Isolated rock rock , 25 - relative height in meters
- a) ຫລຸມ ; b) ຈອກນ້ອຍ ; c) ຖ້ຳ
  a) Hole ; b) small hill ; c) cavern
- a) ເສັ້ນລະດັບ ; b) ເສັ້ນລະດັບຫລັກ ; c) ເສັ້ນລະດັບ ; d) ເຄື່ອງບອກທິດທາງ ; 76 - ຈຸດລະດັບ ເປັນແມັດ
  a) Index contour ; b) principal contour ; c) intermediate contour ; d) indicator for slope direction , 76 - spot elevation in meters
- ດິນແຕ່ຈອນ
  Earth crumbling
- a) ຄ້ຳ, b) ດິນແຕ່ຈອນ
  a) Rock wall , cliff ; b) accumulated stones
- ຮ່ອງ
  Rain gully , ravine
- ດິນ
  Stony terrain
- ດິນ
  Sandy terrain
- ດິນ
  Gravel terrain
- ໂງ່ນ
  Monolith , scattered rocks , rock outcrop
- a) ຕົ້ນ
  a) Remarkable tree ; b) isolated tree
- ກຸ່ມ
  Small group of trees
- ຂອບ
  Vegetation boundary
- a) ປ່າ ; b) ປ່າ
  a) Dense forest ; b) thin forest
- ປ່ານ້ອ
  Shrub , bush
- ເຂດ
  Bamboo area
- ເຂດ
  Dead trees area
- ຫ້ວ
  Grass , weeds land
- ດິນ
  Swamp
- ດິນ
  Seasonal swamp
- ສວນ
  Orchard
- a) ຫ້ວ, b) ດິ
  a) Rice field ; b) upland rice field , other fields
- ສວນ ; a) ປ
  Plantation ; a) tree type ; b) shrub type , c) grass type
  - S.Mon - mulberry plantation
  - S.Cafe - coffee plantation
  - S.Ya - tobacco plantation
  - S.Oy. - sugar cane plantation
  - S.Mn. - pineapple plantation
  - S.K. - banana plantation
  - S.Ng - lotus plantation
- ເ
  International boundary
- ເ
  Provincial boundary

ADMINISTRATION CENTER

VIENTIANE ..... Metropole

SALAVAN ..... Capital of Province

VANGVIANG ..... Capital of district

VILLAGE

B.Thangen ..... Village

B.Hana ..... Abandoned village

GLOSSARY

M.	Muang	Capital of district
B.	Ban	Village
Nam,Xe	Nam,Xe	River
H.	Houay	Stream
Phou,Doy	Phou,Doy	Mountain
Sayphou	Sayphou	Mountain range
Phu	Phu	Hill
Kang	Kang	Rapid
Pa,Doung	Pa,Doung	Forest
Thang,Na	Thang,Na	Field,rice field
Nong	Nong	Pond

JICA